Администрирование сетевых подсистем

Лабораторная работа №2

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25 ноября 2025

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Цели и задачи работы

Цель лабораторной работы

Приобретение практических навыков установки, конфигурирования и тестирования DNS-сервера, а также понимания принципов работы системы доменных имён.

Ход выполнения

Проверка работы DNS-клиента

```
[root@server.dgavdadaev.net ~]#
[root@server.dgavdadaev.net ~]# dig www.yandex.ru

; <<>> DiG 9.18.33 <<>> www.yandex.ru
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 44341
;; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 512
;; QUESTION SECTION:
;www.yandex.ru.                 IN      A

;; ANSWER SECTION:
www.yandex.ru.          241     IN      A       5.255.255.77
www.yandex.ru.          241     IN      A       77.88.44.55
www.yandex.ru.          241     IN      A       77.88.55.88

;; Query time: 24 msec
;; SERVER: 10.0.2.3#53(10.0.2.3) (UDP)
;; WHEN: Tue Nov 25 09:03:35 UTC 2025
;; MSG SIZE  rcvd: 90

[root@server.dgavdadaev.net ~]#
```


Рис. 1: dig www.yandex.ru

Анализ конфигурации DNS

```
[root@server.dgavdadaev.net ~]#
[root@server.dgavdadaev.net ~]# cat /etc/resolv.conf
# Generated by NetworkManager
search dgavdadaev.net
nameserver 10.0.2.3
[root@server.dgavdadaev.net ~]# cat /etc/named.conf
//
// named.conf
//
// Provided by Red Hat bind package to configure the ISC BIND named(8) DNS
// server as a caching only nameserver (as a localhost DNS resolver only).
//
// See /usr/share/doc/bind*/sample/ for example named configuration files.
//

options {
        listen-on port 53 { 127.0.0.1; };
        listen-on-v6 port 53 { ::1; };
        directory       "/var/named";
        dump-file       "/var/named/data/cache_dump.db";
        statistics-file "/var/named/data/named_stats.txt";
        memstatistics-file "/var/named/data/named_mem_stats.txt";
        secroots-file   "/var/named/data/named.secroots";
        recursing-file  "/var/named/data/named.recursing";
        allow-query     { localhost; };

        /*
         - If you are building an AUTHORITATIVE DNS server, do NOT enable recursion.
         - If you are building a RECURSIVE (caching) DNS server, you need to enable
```

Рис. 2: Конфигурация DNS

Анализ конфигурации DNS

```
[root@server.dgavdadaev.net ~]#
[root@server.dgavdadaev.net ~]# cat /var/named/named.ca
;       This file holds the information on root name servers needed to
;       initialize cache of Internet domain name servers
;       (e.g. reference this file in the "cache  .  <file>"
;       configuration file of BIND domain name servers).
;
;       This file is made available by InterNIC
;       under anonymous FTP as
;           file                /domain/named.cache
;           on server           FTP.INTERNIC.NET
;       -OR-                    RS.INTERNIC.NET
;
;       last update:     December 20, 2023
;       related version of root zone:     2023122001
;
; FORMERLY NS.INTERNIC.NET
;
.                       3600000      NS    A.ROOT-SERVERS.NET.
A.ROOT-SERVERS.NET.     3600000      A     198.41.0.4
A.ROOT-SERVERS.NET.     3600000      AAAA  2001:503:ba3e::2:30
;
; FORMERLY NS1.ISI.EDU
;
.                       3600000      NS    B.ROOT-SERVERS.NET.
B.ROOT-SERVERS.NET.     3600000      A     170.247.170.2
B.ROOT-SERVERS.NET.     3600000      AAAA  2801:1b8:10::b
;
; FORMERLY C.PSI.NET
;
```

Анализ конфигурации DNS

```
[root@server.dgavdadaev.net ~]# cat /var/named/named.localhost
$TTL 1D
@       IN SOA  @ rname.invalid. (
                                        0       ; serial
                                        1D      ; refresh
                                        1H      ; retry
                                        1W      ; expire
                                        3H )    ; minimum
        NS      @
        A       127.0.0.1
        AAAA    ::1
[root@server.dgavdadaev.net ~]# cat /var/named/named.loopback
$TTL 1D
@       IN SOA  @ rname.invalid. (
                                        0       ; serial
                                        1D      ; refresh
                                        1H      ; retry
                                        1W      ; expire
                                        3H )    ; minimum
        NS      @
        A       127.0.0.1
        AAAA    ::1
        PTR     localhost.
[root@server.dgavdadaev.net ~]#
```

Сравнение работы внешнего и локального DNS

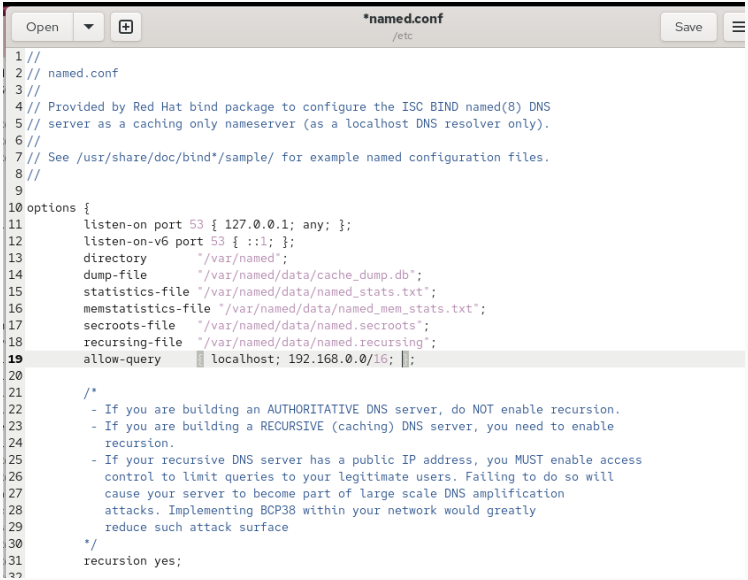
```
[root@server.dgavdadaev.net ~]# dig @127.0.0.1 www.yandex.ru
;; communications error to 127.0.0.1#53: timed out

; <<>> DiG 9.18.33 <<>> @127.0.0.1 www.yandex.ru
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 54610
;; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: 96a73093f679ea3601000000925723dbf6bc8d8243e3719 (good)
;; QUESTION SECTION:
;www.yandex.ru.                 IN      A

;; ANSWER SECTION:
www.yandex.ru.          600     IN      A       77.88.44.55
www.yandex.ru.          600     IN      A       77.88.55.88
www.yandex.ru.          600     IN      A       5.255.255.77

;; Query time: 1636 msec
;; SERVER: 127.0.0.1#53(127.0.0.1) (UDP)
;; WHEN: Tue Nov 25 09:09:17 UTC 2025
;; MSG SIZE  rcvd: 118

[root@server.dgavdadaev.net ~]#
```

Настройка локального DNS сервера

```
[root@server.dgavdadaev.net ~]# nmcli connection edit eth0

===| nmcli interactive connection editor |===

Editing existing '802-3-ethernet' connection: 'eth0'

Type 'help' or '?' for available commands.
Type 'print' to show all the connection properties.
Type 'describe [<setting>.<prop>]' for detailed property description.

You may edit the following settings: connection, 802-3-ethernet (ethernet), 802-1x, dcb, sriov, ethtool, match, ipv4
, ipv6, hostname, link, tc, proxy
nmcli> remove ipv4.dns
nmcli> set ipv4.ignore-auto-dns yes
nmcli> set ipv4.dns 127.0.0.1
nmcli> save
Connection 'eth0' (e292e83a-7750-4087-b4e1-a998fc55c0ea) successfully updated.
nmcli> quit
[root@server.dgavdadaev.net ~]# systemctl restart NetworkManager
[root@server.dgavdadaev.net ~]# cat /etc/resolv.conf
# Generated by NetworkManager
search dgavdadaev.net
nameserver 127.0.0.1
[root@server.dgavdadaev.net ~]#
```

Рис. 6: Настройка NetworkManager

Изменение named.conf



Проверка работы UDP-порта 53

```
[root@server.dgavdadaev.net ~]# gedit /etc/named.conf
[root@server.dgavdadaev.net ~]#
[root@server.dgavdadaev.net ~]# firewall-cmd --add-service=dns
success
[root@server.dgavdadaev.net ~]# firewall-cmd --add-service=dns --permanent
success
[root@server.dgavdadaev.net ~]# lsof | grep UDP
lsof: WARNING: can't stat() fuse.gvfsd-fuse file system /run/user/1001/gvfs
      Output information may be incomplete.
lsof: WARNING: can't stat() fuse.portal file system /run/user/1001/doc
      Output information may be incomplete.
avahi-dae   880                          avahi   12u     IPv4               8003      0t0        UDP *:mdns
avahi-dae   880                          avahi   13u     IPv6               8004      0t0        UDP *:mdns
chronyd     918                         chrony    5u     IPv4               7946      0t0        UDP localhost:323
chronyd     918                         chrony    6u     IPv6               7947      0t0        UDP localhost:323
named     15480                          named   25u     IPv4              75689      0t0        UDP localhost:doma
in
named     15480                          named   26u     IPv4              75690      0t0        UDP localhost:doma
in
named     15480                          named   31u     IPv6              75693      0t0        UDP localhost:doma
in
named     15480                          named   32u     IPv6              75694      0t0        UDP localhost:doma
in
named     15480 15481 isc-net-0          named   25u     IPv4              75689      0t0        UDP localhost:doma
in
named     15480 15481 isc-net-0          named   26u     IPv4              75690      0t0        UDP localhost:doma
in
named     15480 15481 isc-net-0          named   31u     IPv6              75693      0t0        UDP localhost:doma
```

Рис. 8: Проверка UDP 53

Создание файла зон

Настройка прямой зоны

Open

dgavdadaev.net
/var/named/master/fz

```
$TTL 1D
@       IN SOA  @ server.dgavdadaev.net. (
                                        2025112500      ; serial
                                        1D      ; refresh
                                        1H      ; retry
                                        1W      ; expire
                                        3H )    ; minimum
        NS      @
        A       192.168.1.1
$ORIGIN dgavdadaev.net.
server  A       192.168.1.1
ns      A       192.168.1.1
```

Рис. 10: Прямая зона

Настройка обратной зоны

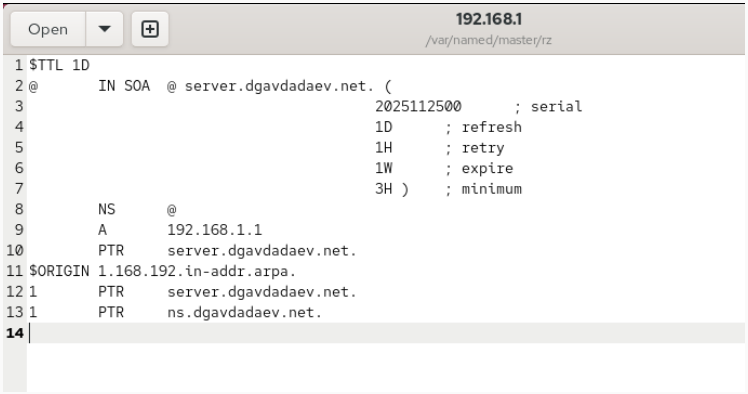


Рис. 11: Обратная зона

Перезапуск службы named

```
[root@server.dgavdadaev.net rz]#
[root@server.dgavdadaev.net rz]# systemctl restart named
[root@server.dgavdadaev.net rz]# systemctl status named
● named.service - Berkeley Internet Name Domain (DNS)
     Loaded: loaded (/usr/lib/systemd/system/named.service; enabled; preset: disabled)
     Active: active (running) since Tue 2025-11-25 09:29:33 UTC; 1s ago
 Invocation: c4c76de801434517b41f6579e61d8ff7
    Process: 18752 ExecStartPre=/bin/bash -c if [ ! "$DISABLE_ZONE_CHECKING" == "yes" ]; then /usr/bin/named-checkco
    Process: 18754 ExecStart=/usr/sbin/named -u named -c ${NAMEDCONF} $OPTIONS (code=exited, status=0/SUCCESS)
   Main PID: 18756 (named)
      Tasks: 6 (limit: 10381)
     Memory: 5.2M (peak: 5.8M)
        CPU: 22ms
     CGroup: /system.slice/named.service
             └─18756 /usr/sbin/named -u named -c /etc/named.conf
```

Рис. 12: Статус named

Проверка зоны dig

```
[root@server.dgavdadaev.net fz]# dig ns.dgavdadaev.net

; <<>> DiG 9.18.33 <<>> ns.dgavdadaev.net
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 51482
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: 70705e1b8be549e801000000692577c8f4108f038f9ab23a (good)
;; QUESTION SECTION:
;ns.dgavdadaev.net.             IN      A

;; ANSWER SECTION:
ns.dgavdadaev.net.      86400   IN      A       192.168.1.1

;; Query time: 0 msec
;; SERVER: 127.0.0.1#53(127.0.0.1) (UDP)
;; WHEN: Tue Nov 25 09:32:56 UTC 2025
;; MSG SIZE  rcvd: 90

[root@server.dgavdadaev.net fz]#
```

Проверка работы host

```
[root@server.dgavdadaev.net fz]# host -l dgavdadaev.net
dgavdadaev.net name server dgavdadaev.net.
dgavdadaev.net has address 192.168.1.1
ns.dgavdadaev.net has address 192.168.1.1
server.dgavdadaev.net has address 192.168.1.1
[root@server.dgavdadaev.net fz]# host -a dgavdadaev.net
Trying "dgavdadaev.net"
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 50088
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 0

;; QUESTION SECTION:
;dgavdadaev.net.                        IN      ANY

;; ANSWER SECTION:
dgavdadaev.net.         86400   IN      SOA     dgavdadaev.net. server.dgavdadaev.net. 2025112500 86400 3600 604800
10800
dgavdadaev.net.         86400   IN      NS      dgavdadaev.net.
dgavdadaev.net.         86400   IN      A       192.168.1.1

Received 105 bytes from 127.0.0.1#53 in 1 ms
[root@server.dgavdadaev.net fz]# host -t A dgavdadaev.net
dgavdadaev.net has address 192.168.1.1
[root@server.dgavdadaev.net fz]# host -t PTR 192.168.1.1
1.1.168.192.in-addr.arpa domain name pointer server.dgavdadaev.net.
1.1.168.192.in-addr.arpa domain name pointer ns.dgavdadaev.net.
[root@server.dgavdadaev.net fz]#
```

Рис. 14: host проверка

Копирование конфигурации DNS

```
[root@server.dgavdadaev.net fz]#
[root@server.dgavdadaev.net fz]# cd /vagrant/
[root@server.dgavdadaev.net vagrant]# mkdir -p /vagrant/provision/server/dns/etc/named
[root@server.dgavdadaev.net vagrant]# mkdir -p /vagrant/provision/server/dns/var/named/master
[root@server.dgavdadaev.net vagrant]# cp -R /etc/named.conf /vagrant/provision/server/dns/etc/
[root@server.dgavdadaev.net vagrant]# cp -R /etc/named/* /vagrant/provision/server/dns/etc/named/
[root@server.dgavdadaev.net vagrant]# cp -R /var/named/master/* /vagrant/provision/server/dns/var/named/master/
[root@server.dgavdadaev.net vagrant]# touch dns.sh
[root@server.dgavdadaev.net vagrant]#
```

Рис. 15: Файлы в /vagrant

Создание provisioning-скрипта dns.sh

```
#!/bin/bash
echo "Provisioning script $0"
echo "Install needed packages"
dnf -y install bind bind-utils
echo "Copy configuration files"
cp -R /vagrant/provision/server/dns/etc/* /etc
cp -R /vagrant/provision/server/dns/var/named/* /var/named
chown -R named:named /etc/named
chown -R named:named /var/named
restorecon -vR /etc
restorecon -vR /var/named
echo "Configure firewall"
firewall-cmd --add-service=dns
firewall-cmd --add-service=dns --permanent
echo "Tuning SELinux"
setsebool named_write_master_zones 1
setsebool -P named_write_master_zones 1
echo "Change dns server address"
nmcli connection edit "eth0" <<EOF
remove ipv4.dns
set ipv4.ignore-auto-dns yes
set ipv4.dns 127.0.0.1
save
quit
EOF
systemctl restart NetworkManager
echo "Start named service"
systemctl enable named
systemctl start named
```

Выводы

Итог лабораторной работы

Настроены прямая и обратная DNS-зоны, изменены параметры BIND, восстановлены права и контекст SELinux, проверена корректность работы DNS-службы.

С помощью dig и host подтверждено функционирование сервера имён.

Конфигурация перенесена в каталог Vagrant для автоматизированного развёртывания.